

only be a matter of time to obtain rust-resisting varieties. Saleability in the market is a somewhat artificial affair. At the present time millers require a "hard" wheat yielding a "strong" flour rather than a "weak" wheat, and, therefore, pay more for it. It is not claimed that strong wheat is more nutritious, but merely that it makes larger and more shapely loaves; there is the further advantage to the baker that a given quantity of strong flour makes a greater weight of bread because it takes up and retains more moisture than an equal weight of weak flour. No doubt an excellent case could be made out for "weak" flour, but that is not the business of the agriculturist; he has simply to provide what his customer wants. The scientific problem of discovering what constitutes strength is under investigation, and the fact that strength is inherited indicates the possibility of crossing it on to wheats possessing other desirable features.

The economic problems in wheat production have rarely been stated better than in Mr. Humphries's lecture before the Royal Society of Arts. For a number of years past British wheat has been sold at prices substantially lower than the best foreign wheat because it lacks strength. Probably few bakers would risk making bread from British wheat alone; they require foreign wheat to be mixed with it. Consequently, the mills are handicapped unless they are within easy access of a seaport. The Home-grown Wheat Association are trying to find whether strong wheat can be profitably produced in England; their experiments have already shown that strength is inherent in the variety, and is not the result of external conditions, though it is influenced by them; they have also demonstrated that the great Canadian wheat, Red Fife, keeps its strength when grown here. The Canadian farmer is satisfied with 20 bushels to the acre, but the British farmer, having heavier charges to meet, must get more than 30, and on occasions, in favourable districts, will even get 60 or more bushels of grain and good crops of straw. Unfortunately, Red Fife does not give these heavy crops, and is, therefore, not in much favour here. It is hoped, however, that crosses combining the strength of Red Fife with the cropping power of the standard English varieties will in time be available.

Other countries are also seeking to improve the strength of their wheats. Indian wheat, for instance, is at present no stronger than ours, but Mr. and Mrs. Howard have grown wheats at Pusa which were very favourably reported on by the English milling expert who examined them. One especially was praised, a wheat (Pusa 6) selected in 1906 and grown from a single plant. It has the further advantage that it is resistant to rust, and matures well even on second-class wheat soils. Canadian wheats are under constant investigation at Ottawa. The Agricultural Department of South Australia also conducts experiments, the results of which appear from time to time in its journal.

The introduction of strong wheats into English agriculture would unquestionably alter the conditions of wheat-growing here, and whilst strong varieties are being raised it is desirable to ascertain the precise cost of wheat production by modern methods and using modern labour-saving appliances. There is a great deal of work to be done in this direction. Mr. Mackenzie's paper in the *Journal of the Board of Agriculture* provides data for ascertaining the cost of harvesting; similar records for other operations are badly needed.

E. J. RUSSELL.

THE LONDON INSTITUTION.

AT the annual meeting of the proprietors of the London Institution, held on April 28, it was announced that, in view of the appointment of the Royal Commission on University Education in London, which had officially informed the Institution that they regarded it as coming under their purview, the scheme for amalgamation with the Royal Society of Arts must remain in abeyance. The solicitor of the institution had advised that Parliament would not pass a Bill altering the status of an institution the position of which was already under the consideration of a Royal Commission, and, assuming that opinion to be sound, as it probably is, it would certainly be inexpedient immediately to proceed with the Royal Society of Arts scheme, or any other that involved an Act of Parliament. A considerable opposition to the ratification of the scheme had been worked up, and an attempt was to be made to alter the constitution of the board, but upon the announcement that the scheme was not to be proceeded with at present, the opposition to the existing board was withdrawn. Whether the scheme which has now been shelved, at any rate for the present session, will be revived after the Royal Commission on University Education in London has reported is very doubtful.

From the outset the Royal Society of Arts has been unwilling to be a party to the scheme unless there was something like practical unanimity on the part of members of the London Institution. If the management of that institution had been in stronger hands it is probable that little would have been heard of opposition. Very similar opposition to the proposal to dispose of the Zoological Society's freehold premises in Hanover Square, and to expend the proceeds in providing suitable accommodation for the Society's offices and library at the Zoological Gardens, was summarily dealt with on April 29. But there seems to have been no strong hand at the helm at the London Institution, and the final result will probably be that a scheme which would have been of considerable benefit to two important institutions will fall through. The idea seems to be to make the London Institution a sort of school of economics, an excellent thing in itself, but not wanted, seeing that there is already existing an institution amply able to meet the requirements of the public in this direction.

At the meeting last week Lord Aldenham stated that the managers had received a letter from the Corporation asking whether they were open to receive proposals, and they answered in the affirmative, but no definite suggestion has been received from that source. Probably the best thing to do with the institution, if the scheme of amalgamation with the Royal Society of Arts is to fall through, would be to sell its land, and whatever else it has to sell, and divide the proceeds, so far as other claims permit, amongst certain educational institutions in the City.

NOTES.

THE first of the two annual soirees of the Royal Society will be held on Wednesday next, May 12.

WE announce with regret the death of Dr. F. G. Yeo, F.R.S., emeritus professor of physiology, King's College, London, at sixty-four years of age.

WE regret to see the announcement of the death, at seventy-five years of age, of Dr. J. Marshall Lang, Chancellor and Principal of Aberdeen University since 1900.

A REUTER message from Ottawa states that the Government has established a geodetic survey department for Canada under Dr. W. F. King, chief astronomer of the Dominion.

At a meeting of the Aëronautical Society of Great Britain held on Monday, the gold medal of the society was presented to Messrs. Wilbur and Orville Wright in recognition of their distinguished services to aëronautical science.

At a special general meeting of the Zoological Society on April 29 it was decided to dispose of the site of the society's freehold premises in Hanover Square, and to expend the proceeds upon the erection of new offices, library, and meeting-room at the Zoological Gardens in Regent's Park, and on the general improvement of the gardens.

A DESPATCH to the *New York Evening Post* from a correspondent in the West reports the discovery, near Esperanza, Mexico, of a stone inscription believed to have been carved by the Mayas of Yucatan, and to be more than a thousand years old. Some pottery of the Mayas was found at the same time. There had previously been no evidence of their having come so far north. The discoveries have been made by Major F. R. Burnham, D.S.O., and Mr. C. F. Holder, of Pasadena.

THE Royal Society of London invites applications for two Mackinnon studentships, each of the annual value of 150*l.* These studentships, which are restricted to British subjects, are awarded for the purpose of conducting researches, one in the group of the physical sciences, including astronomy, chemistry, geology, mineralogy, and physics, the other in the group of the biological sciences, including anatomy, botany, palæontology, pathology, physiology, and zoology. The present holder of the studentship in biology offers himself for re-election. Applications must be sent in to the Royal Society not later than June 1 on forms which can be obtained from the assistant secretary of the Royal Society, Burlington House, W.

STATEMENTS have been made in the medical and general Press that the electric waves used in wireless telegraphy are injurious to the operators and produce various diseases, such as conjunctivitis, corneal ulceration, and leukoma. Mr. Marconi writes to the *Times* to deny these suggestions, for which, he says, there is no evidence whatever. He adds :—"During the twelve years or so of our operations we have had to deal with no single case of compensation for any injury of this origin, nor, so far as I can ascertain, has any such injury been suffered. Speaking for myself, I may remark that my own good health has never been better than during the often extended periods when I have been exposed for many hours daily to the conditions now challenged, and in the constant neighbourhood of electrical discharges at our Transatlantic stations, which I believe are the most powerful in the world."

THE annual meeting of the Naples Table Association for Promoting Scientific Research by Women was held on April 24 at the American Museum of Natural History. Miss Caroline McGill, of the University of Missouri, was appointed a scholar of the association at the Naples station. We are informed that the award of the prize of one thousand dollars offered every second year for the best thesis written by a woman on a scientific subject, embodying new observations and new conclusions based on

an independent laboratory research in biological, chemical, or physical science, was made to Miss Florence Buchanan, D.Sc., of London University, fellow of University College, London, for a thesis entitled "The Time Taken in the Transmission of Reflex Impulses in the Spinal Cord of the Frog." Miss Buchanan has been engaged in research work at the University Museum, Oxford, since 1896, and has published sixteen papers. It is worthy of remark that, of the eleven theses presented in competition, five were sent from England and one from Canada. The subjects of four were morphological, of two bacteriological, of two zoological, one physiological, one was in the domain of physical chemistry, and one in parasitology. The general average of these investigations was very high, distinctly above those of the three previous competitions. A fifth prize will be offered in 1911.

THE year 1911 will be the centenary of the publication of Avogadro's celebrated memoir on the molecular constitution of gases. In that memoir he arrived at the generalisation that equal volumes of gases at the same temperature and pressure contain the same number of molecules—a law which has borne rich fruit both in chemistry and physics. To commemorate the discovery of Avogadro's law, a committee has been formed by the Royal Academy of Sciences of Turin to obtain subscriptions for the publication of the most important of Avogadro's works in one volume, and the erection of a monument to him at Turin, where he was born in 1776, and died, while still professor of physics there, in 1856. An appeal is made to chemists and physicists for contributions to the fund being raised. The committee is international in its constitution, and includes the names of many men of distinguished eminence in the world of physical science. Subscriptions should be sent to the treasurer, Royal Academy of Sciences, Via Maria Vittoria 3, Turin.

THE seventy-seventh annual meeting of the British Medical Association will be held in Belfast on July 23–31. The president-elect is Sir William Whitla, professor of materia medica and therapeutics, Queen's College, Belfast. The address in medicine will be delivered by Dr. R. W. Philip, that in surgery by Prof. A. E. J. Barker, and that in obstetrics by Sir John W. Byers. The popular lecture will be delivered by Dr. J. A. Macdonald. The scientific business of the meeting will be conducted in fifteen sections, which will meet on Wednesday, July 28, Thursday, July 29, and Friday, July 30. The presidents of the sections are as follows :—Anatomy and physiology, Prof. C. S. Sherrington, F.R.S.; dermatology and electrotherapeutics, Dr. W. Calwell; diseases of children, Mr. H. J. Stiles; hæmatology and vaccine therapy, Sir Almoth Wright, F.R.S.; hygiene and public health, Dr. L. C. Parkes; laryngology, otology, and rhinology, Dr. St. Clair Thomson; medicine, Prof. J. A. Lindsay; navy, army, and ambulance, Fleet-Surgeon J. Lloyd Thomas, R.N.; obstetrics and gynaecology, Dr. J. Campbell; ophthalmology, Dr. J. W. Browne; pathology, Prof. Wm. St. Clair Symmers; pharmacology and therapeutics, Prof. R. Stockman; psychological medicine, Dr. T. Outtersson Wood; surgery, Prof. T. Sinclair; tropical medicine, Mr. C. W. Daniels.

THE Liverpool Marine Biological Station at Port Erin, in the Isle of Man, has been utilised, in all its departments, to the fullest possible extent during the past Easter vacation. A class of senior students from the University of Liverpool occupied the large upper laboratory, and went through a course of practical marine biology under

the direction of Dr. Pearson and Mr. D. Laurie. The ground-floor laboratories have been occupied during the last six weeks by about ten or twelve investigators, including Dr. H. E. Roaf, working on the digestive ferments of various Invertebrata; Mr. W. J. Dakin, working on the nervous system of Pecten, and also making hydrographic observations on samples of sea-water; Mr. W. Riddell, assisting Prof. Herdman in his plankton investigations at sea; and several others. In the fish hatchery Mr. Chadwick has this year increased the output of young plaice; between nine and ten millions of eggs have been dealt with in the hatchery boxes during March and April, and Prof. Herdman has set free between seven and eight millions of young fry of the plaice from the S.Y. *Ladybird* at distances of from five to thirteen miles off land, in directions ranging from south-west to north of Port Erin, so that some millions have been carried by the south-going tide around the Chicken Rock to the eastern side of the Isle of Man, while others have been carried by the northern tidal system up the west and round the northern end of the island. In each year, recently, some fry produced in the fish hatchery have been retained in the spawning ponds until they underwent their metamorphosis and appeared on the bottom as healthy young flat-fish. These specimens reared in captivity were found on investigation to be feeding on diatoms, and at the present time, in the Irish Sea, the vernal increase in diatoms seems to be at about its greatest height.

WE have received a communication from Dr. J. B. Charcot, leader of the French Antarctic Expedition, from Deception Island, South Shetlands, dated December 24, 1908. The *Pourquoi-pas?* left Puntas Arenas on December 16, and arrived at Deception Island on December 22 in company with a Norwegian whaler that was met with off Smith Island. At Deception Island Dr. Charcot met two other Norwegian and one Chilean whaler, and thirty tons of coal were taken on board from the whaling station set up in Pendulum Cove by La Sociedad Ballenera Magellanes. So far, Dr. Charcot has naturally little news of interest, since the voyage has only begun. In fact, the chief interest is that now, for the first time for nearly a century, an exploring ship has met with sealers and whalers south of the latitude of Cape Horn. That an exploring ship can obtain its last supply of coal in 63° S. instead of 53° S. is of the utmost importance. Ships are able to cross the heavy seas of Drake Strait in better time, and have 600 miles extra start towards the south. The fact of this whaling station, with 200 men, two large steamers of more than 3000 tons, and eight small ones, existing at Deception Island is an eloquent testimony of commercial success following up scientific investigations. There was no word of such an industry being opened up before the departure of the Scottish and Swedish expeditions in 1901-4. When Dr. Charcot left Deception Island on December 25 general physical and biological investigations had begun, including actinometric observations during the eclipse of the sun on December 21, and pendulum records at the same point as Foster made them in 1829. He intended to steer for Port Lockroy and Port Charcot, and thereafter to the south and west along the west coast of Graham Land. During the three years the whaling station has existed, this region has never been so free of ice, which augurs well for the success of the French expedition.

APRIL was a record month for bright sunshine over the southern and eastern portions of England, and the duration of sunshine was in excess of the average in most parts of the kingdom. At Dover the sun was shining for 273

hours, and at several places in the south and east of England the duration exceeded 250 hours. At the London reporting station of the Meteorological Office, in Westminster, the bright sunshine amounted to 220 hours, whilst the previous brightest April occurred in 1906, with 207 hours. At Greenwich the duration of bright sunshine was 250 hours, which is 103 hours more than the normal, and there was only one day without sunshine. The mean temperature at Greenwich was 2.3° in excess of the average, and rain fell on thirteen days, yielding a total of 1.71 inches, which is 0.14 inch more than the average. The summary of the weather issued by the Meteorological Office shows an excess of sunshine since the beginning of the year over the whole of England and Ireland, but a slight deficiency in Scotland. In the south-east of England the excess of sunshine for the past four months amounts to 101 hours, and in the north-west of England to ninety-four hours.

IN No. 1665 of the Proceedings of the U.S. National Museum (vol. xxxvi., pp. 191-6) Dr. O. P. Hay describes specimens of two fossil chelonians, one of which forms a new species.

IN the Journal of the Royal Microscopical Society (1908, pp. 529-43) Messrs. E. Heron-Allen and A. Earland describe, under the name *Cycloloculina*, a new genus of Foraminifera collected from the shore-sand of Selsey Bill between Bracklesham Bay and Chichester Harbour. The specimens on which the genus is founded are fossils, and were found in company with many other Foraminifera washed out of Secondary and Tertiary strata. They resemble *Planorbulina* in their general appearance, but when mounted in balsam are seen to have quite a different mode of growth. Two species are described as *C. annulata* and *C. polygyra*.

IN commemoration of Mr. Roosevelt's projected hunting trip in East Africa, the *National Geographic Magazine* devotes its March number to papers on Africa. Sir H. Johnston gives a delightful account, illustrated by admirable photographs, of the region which the ex-President hopes to explore. The Nandi forests he believes to be vestiges of the ancient forest-belt that stretched from the Indian to the Atlantic Oceans, and he points out that its fauna is more closely allied to that of East India and Malaysia than to West India or East Africa. The discovery of the okapi encourages the hope that if he explores this region in a systematic way, Mr. Roosevelt may discover other beasts and birds unknown to science. He may obtain specimens of the giant pig first discovered in Stanley's Ituri forest by Mr. N. E. Copeland, and he is anxious to secure the white or square-lipped rhinoceros, long supposed to be confined to Africa south of the Zambezi, where it is nearly, if not quite, extinct; it is now reported to exist in the north-western parts of British East Africa. He may also encounter the wonderful earthworm as large as a snake and coloured a brilliant verditer-blue. At any rate, he will find forests rivalled in luxuriance only by those of the Congo Free State and the Kameruns, the finest conifers in Africa, the largest continuous area of marsh, the largest lake, and the highest point in the continent. As for the people, he will meet pygmies, fanatical Mohammedans, enthusiastic Christians, and specimens of nearly all the most marked and interesting types of African man.

SOME years ago Sir Lauder Brunton suggested that it might be possible to relieve certain forms of heart disease by a surgical operation on the valves of the heart. Dr.

Bernheim records, in the Bulletin of the Johns Hopkins Hospital for April (xx., No. 217), some experiments performed on dogs in this connection; the results are encouraging, and suggest that the procedure offers no greater technical difficulties than numbers of others which are in daily practice.

In a report by Mr. E. H. Ross on the prevention of fever on the Suez Canal (Cairo: National Printing Department, 1909), mosquito destruction at Port Said and its results are reviewed. After three years' work a great reduction in the number of mosquitoes has been effected, and in consequence malaria has much diminished, also continued fever and dengue. Although the population is increasing steadily, the death-rate for 1908 is 150 below the average for the previous five years. It is not possible completely to exterminate mosquitoes, and the campaign has to be continued. In an appendix certain interesting features in the biology of mosquitoes (*Culex fatigans* and *Stegomyia fasciata*) are detailed. It is found that male mosquitoes do not live more than a few days, and are much more numerous than females. The females apparently desire to suck blood only after fertilisation.

In a third report on research work, Dr. Houston, director of water examinations, Metropolitan Water Board, discusses the value of the storage of raw river water antecedent to filtration as a means of purification. The medical advisers of the Local Government Board have long held the view that "time" is to be regarded as an important element among conditions that in nature combine to annul the vital activities of particulate matter which is the cause of disease, and in no direction perhaps is this "time factor" of more importance than in the storage of impure river water. The results of a large amount of experimental work, chemical and bacteriological, undertaken to investigate this question are given in this report. They show that the total number of micro-organisms and of *B. coli* are very considerably reduced by storage. The stored waters also contained less ammoniacal nitrogen and less oxidised nitrogen, and absorbed less oxygen from permanganate; as regards albuminoid ammonia, however, only Chelsea water showed a reduction; Lee water was unaltered, and Staines and Lambeth suffered an apparent increase. The engineers reported that the use of stored water prolongs the life of the filter-beds. It is concluded that an adequately stored water is to be regarded as a "safe" water, and its use would render any accidental breakdown in the filtering arrangements much less serious than otherwise might be the case. Although it would be preferable to regard thirty days as a minimum period of storage, this would entail the construction of huge reservoirs, and it is suggested that thirty days' storage might be considered a maximum, adopting in addition, during times of stress and storm, an intermediate system of purification (e.g. by mechanical filters or by precipitation tanks) between storage and sand filtration.

A SECOND part of the illustrated studies in the genus *Opuntia*, by Mr. D. Griffiths, has been received, being an advance publication from the twentieth annual report of the Missouri Botanical Garden. It consists chiefly of descriptions of new species from the States of Mexico, Texas, and Arizona, with illustrations to indicate the general habit, fruits, and seeds.

An article by Mr. E. Maigre on geotropism and the statolith theory appears in the *Revue générale des Sciences* (March 15). Discussing the much-debated question as to the exact position at which the root is sensitive to geo-

tropic stimulus, the author lays stress on Picard's experiment, in which the root was rotated round an axis oblique to the longitudinal axis of the root. The root was placed in different experiments so that the axis of rotation cut it at different points between the tip and region of growth, and thereby the stimulus produced by centrifugal force acted oppositely on the two regions. The author defends the statolith theory mainly on the strength of Buder's recent researches, which consisted in turning the root sharply through an angle of 180° at stated intervals, when it was found that the curvatures produced were in conformity with the theory.

MR. E. D. MERRILL contributes three articles to the botanical number of the *Philippine Journal of Science* (vol. iii., No. 6) published in December, 1908. A revision of native species of *Garcinia* shows seventeen species, of which twelve are endemic and five are new to science. The indigenous Ericaceæ are collated under the genera *Vaccinium*, with nineteen species, *Gaultheria*, *Diplycosia*, and *Rhododendron*, with sixteen species; all are plants growing at medium or high altitudes, and according to existing records, out of thirty-nine species as many as thirty-six are endemic. The third contribution relates to collections of plants from the Batanes and Babuyan islands, which furnish evidence of a strong affinity with the flora of the other Philippine islands and a very slight affinity with the flora of Formosa. There is also a noteworthy communication to the journal by Dr. E. B. Copeland regarding new genera and species of Bornean ferns. The new genera are *Macroglossum*, a marattiaceous fern, and *Phanerosorus*, the latter being, however, a new title for *Matonia sarmentosa*.

THE reports on the botanic station, agricultural instruction, and experiment plots at Grenada are to hand. The chief industries of the island are cacao and nutmeg cultivation, but it is suggested that fodder crops and ground provisions might with advantage be more extensively grown. Interest is being taken in rubber planting; *Hevea brasiliensis* appears to be more promising than *Castilloa elastica*. It has been demonstrated that Sea Island cotton can be produced on land near the coast. The importance of improved methods of cultivation and treatment in cacao orchards has been continuously urged upon growers, and both large and small owners are adopting such methods. Prize-holdings competitions have been introduced among the peasantry, and have been found to encourage better methods of working.

MYCOLOGISTS will be interested in the regulations drawn up by the Board of Agriculture of British Guiana, and recorded in the *Agricultural News* for March 20, dealing with the importation of sugar-canes, and having for their object the exclusion of plant diseases so far as is possible. Canes from stated places must not be imported in any description of earth or soil. They are to be inspected on arrival by the Government botanist, and if infected with any pest or disease not commonly known in the colony they are to be destroyed; if infected with any common pest or disease they are to be treated as the botanist directs. Those passed by the botanist are to be planted in a nursery apart from the general cultivation, and subject to inspection for twelve months; if during that time any pest or disease appears, they are to be destroyed if the pest is new, or treated as the botanist directs should it already occur in the colony. The regulations are very stringent, but the introduction of new pests and diseases is a very serious matter to agriculturists, and entails a great amount of trouble besides considerable financial loss.

THREE parts of the "Palæontologia Indica," just received from the Geological Survey of India, contain important memoirs on the Lower Mesozoic invertebrate faunas of the Indian region. A collection of fossils, chiefly bivalved shells, obtained by Messrs. T. D. La Touche and P. N. Datta from the Napeng beds of the Northern Shan States of Burma, is described by Miss Maud Healey, who shows the fauna to be remarkably similar to that from the Rhætic formation of Europe. Even the characteristic *Avicula contorta* occurs. The fossils, however, are much distorted, and preserved only as imperfect casts, so that their exact determination is almost impossible. Miss Healey remarks that very similar bivalves have also been found in rocks on the west coast of Sumatra which are not Eocene, as hitherto supposed, but really of Rhætic age. New collections, chiefly of Cephalopoda, from the Trias of Spiti, in the Himalayas, are described by Prof. Carl Diener, who makes an interesting contribution to our knowledge of this much-discussed formation. He treats especially of the Upper Muschelkalk, and compares in detail the several zones with those recognised in Europe. A remarkable collection of fossils from scattered blocks of Upper Triassic and Liassic age, found in the frontier district between Hundes and Malla Johar, is also described by Prof. Diener. Basing his studies chiefly on ammonites, he concludes that "the difference between the Liassic faunæ of Würtemberg or England and the Alps is more conspicuous than that between the Mediterranean and Tibetan faunæ of the Lower Lias."

MR. B. GOMME recently issued the "Index of Archaeological Papers published in 1907," which forms the seventeenth annual number of this publication, originally started by his father, Mr. G. L. Gomme. It contains references to the proceedings of fifty-two learned societies in Great Britain and Ireland, and is likely to be useful to all who are interested in archaeology. Many societies are subscribers to this index, which they issue with their annual Proceedings, a course which may be safely recommended for general adoption. This publication would be of much more practical value if, in addition to the bare titles of communications, a short abstract of the contents or a summary of the views advocated by the author were appended.

IN the April number of *Man* Mrs. M. E. Cunningham directs attention to a remarkable feature in the entrenchment known as Knap Hill Camp, in Wiltshire. Along the exposed side of the camp the entrenchment is pierced by no fewer than six openings or gaps, which were formerly supposed to be cattle-tracks or made for agricultural purposes. Excavations, however, show that none of them is the result of wear or accident, and that they represent gangways intentionally left in the circumvallation. Something of the same kind was remarked by General Pitt-Rivers at Winkelbury Camp, and he supposed that they were gangways adapted to allow in an emergency a considerable number of cattle to enter the camp. In this case, Mrs. Cunningham urges that it would have been simpler to make one or two wide entrances. From the fact that these causeways lie askew to the gaps in the rampart she suggests that they may have been purposely left as positions from which the defenders could enfilade the ditch, the distance from one causeway to another being not greater than could be covered by hand-thrown missiles. It is to be hoped that the fuller exploration of the site which the writer promises will throw further light on the interesting problems connected with prehistoric fortresses which are raised in this communication.

THE report of the Danish Meteorological Institute on the state of the ice in the Arctic seas during 1908 shows that the general distribution of the Polar ice was almost the opposite of that observed in the preceding year. During 1907 greater masses of ice than usual drifted from the Arctic Ocean towards Franz Joseph Land and Spitsbergen and along the east coast of Greenland, whereas during 1908 those regions were more approachable and free from ice than is normally the case. The supposition that the change was due to the ice having found an outlet elsewhere is supported by the fact that the ice conditions were reported as specially unfavourable in the Bering and Beaufort Seas.

THE meteorological and magnetical report of the Royal Cornwall Polytechnic Society, containing the observations made at Falmouth during 1908, has been received. This important observatory receives an annual grant of 250l from the Meteorological Committee for the supply of hourly meteorological observations, and is at present subsidised by the Royal Society and British Association for the maintenance of magnetic observations. At the request of the International Conference on Terrestrial Magnetism it supplies a table of the daily magnetic records to the Royal Netherlands Institute for publication with similar data from other observatories; the magnetic results are also published by the National Physical Laboratory. A comparison of the air- and sea-temperature observations for 1908 shows that the mean of the latter (52.9°) was 1.3° above that of the air; from May to July inclusive the mean sea temperature was lower than that of the air. The rainfall amounted to 37.6 inches, being 4.4 inches below the average. A chart is added to the report showing the annual rainfall for thirty-seven years, 1872-1908, registered by the self-recording rain-gauge; the wettest year was 1872, rainfall exceeding 64 inches, and the driest 1887, rainfall less than 30 inches. The mean magnetic declination for the year was $17^{\circ} 54' W$.

MR. S. S. BUCKMAN has sent us a copy of a paper (Oxford: Parker and Son) in which he advocates a scale of notation with radix 8 instead of 10. His proposals are more revolutionary than this change necessarily implies, for he would write the numerals upside down, and completely alter his weights, measures, and coinage down to a charge of $7\frac{1}{2}d$. for telegrams. Apart from the objection that in Austria even the change from *kreuzer* to *heller* took years to accomplish (and *kreuzer* are probably not dead yet), we note that the advantages of "octonary numeration" were clearly and plainly set forward, without the introduction of unnecessary complications, by Prof. Woolsey Johnson in October, 1891 (Bulletin New York Mathematical Society, i., 1).

THE importance of the discovery made by Prof. Townsend last year, that when a gas is ionised by Röntgen rays positive ions are produced having double the electric charge previously regarded as the ionic charge, has led Drs. J. Franck and W. Westphal, of the University of Berlin, to investigate the properties of these doubly charged ions in some detail, and their results were communicated to the German Physical Society on March 5. They find that the mobility of the ions in an electric field, as measured by a modification of Zeleny's method, is identical with that of the singly charged ions, while their rate of diffusion, as measured by a method identical in principle with that first used by Townsend, is only half that of the singly charged ions. The double charge is thus accompanied by double mass, and the number of double ions produced by Röntgen rays is, the authors find, only about 9 per cent. of the total number of positive ions.

DR. W. W. COBLENTZ, of the United States Bureau of Standards, recently completed an investigation of the radiation constants of metals with a view to account for the high efficiency of the new metallic filament incandescent electric lamps, and his results are published in part iii. of vol. v. of the Bulletin. The radiation from the filament of an incandescent lamp provided with a fluorite window, after passing through a fluorite prism, was measured by the bolometer while the temperature of the filament was kept constant. From the curve of distribution of energy throughout the range of wave-lengths examined, the radiation constant α of the formula $dE = C\lambda^{-\alpha} e^{-c/\lambda T} d\lambda$ is found for the material of the filament at various temperatures. Its value for a "cavity" black body is known to be 4, while for platinum it is 6. Dr. Coblenz finds it to be about 6 for "flashed" and for untreated carbon, to be between 7 and 8 for silica-coated carbon, between 6 and 8 for platinum and tungsten, between 6 and 7 for tantalum, and to be about 6.8 at all temperatures for osmium. As the temperature at which the lamp is run increases, the radiation constant decreases in the case of the metallic filaments with the exception of osmium. At the normal voltage the constants have the following values:—metallised carbon, 6.1; tantalum, 6.3; tungsten, 6.6; osmium, 6.9. The high value of α explains the superiority of the osmium lamp.

THE PROCEEDINGS of the American Academy for March contain two papers from the Harvard Laboratory on the atomic weight of chromium. Since the early determination of Berzelius in 1818 ($\text{Cr} = 55.95$), thirty-three values have been placed on record, the earliest being those of Peligot (1844) and the latest those of Meineke (1890). Rejecting one high and one low value, the eleven figures given by Meineke ranged from 52.03 to 52.27, mean 52.12, in good agreement with the earlier values of Siewert (1861), 52.07; Baubigny (1884), 52.13; and Rawson (1889), 52.09. The methods now adopted by Baxter and his colleagues consisted in converting silver chromate and dichromate into the chloride and bromide, and thus deducing the percentage of silver in the chromium compounds. Conversion of chromate into chloride gave $\text{Ag} = 65.0345$ per cent., and into bromide $\text{Ag} = 65.0321$ per cent., mean 65.0333 per cent., whence if $\text{Ag} = 107.88$, $\text{Cr} = 52.008$; conversion of dichromate into bromide gave $\text{Ag} = 49.9692$ per cent., whence $\text{Cr} = 52.013$. It is noteworthy that the final value, $\text{Cr} = 52.01$, differs from the whole number by only one-hundredth of a unit, whereas the figure adopted by the International Committee for the present and previous years, $\text{Cr} = 52.1$, differed by a tenth of a unit. It will be remembered that the recent revision of the atomic weight of nitrogen also resulted in bringing the value within 0.01 of the integer.

MR. J. H. SHAXBY asks us to state that, by an unfortunate mistake, he wrote "Faraday" instead of "Tyndall" in his letter upon the fluorescence of *Lignum Nephriticum*, published last week (p. 249).

OUR ASTRONOMICAL COLUMN.

DEVELOPMENT OF MARTIAN CANALS.—Through the agency of the Kiel Centralstelle (Circular No. 107) we have received a message from Prof. Lowell saying that the development of the Martian canals corroborates the prediction that they would be seen leaving the south polar cap of the planet.

COLOURS AND MAGNITUDES OF STARS.—In a note appearing in these columns on February 4 (p. 410, No. 2049, vol. lxxix.) we directed attention to Mr. Franks's con-

clusions regarding the relation of star colours to star magnitudes in galactic and non-galactic regions.

A note by Miss Bell, appearing in No. 5, vol. lxxix., of the Monthly Notices, confirms Mr. Franks's in showing that there appears to be a slightly more intense relation between luminosity and colour in the galactic regions. This result was obtained by the statistical method of contingency, and a further calculation shows that, as a chance coincidence, the chances are 500 to 1 against there being a group of stars so divergent from stars as a whole as are the galaxy stars, whilst they are 2500 to 1 against any random sample showing the divergency from the whole that the non-galactic stars display.

A GROUP OF RED STARS IN SAGITTARIUS.—Whilst examining the Draper memorial photographs of stellar spectra, Mrs. Fleming has found that a plate covering the area R.A. 18h. 48m. to 19h. 29m., dec. 13.0° S. to 23.1° S. (1900), shows an abnormal number of red stars having peculiar spectra. The positions and spectral types of these stars are given in Circular No. 149 of the Harvard College Observatory. The area includes the n.f. portion of the constellation Sagittarius, and is in the southern border of the Milky Way. Besides twenty-one stars having spectra of the third type, there are six of the same type with the addition of bright hydrogen lines (class Md) and one of the sixth type (class R).

In contradistinction to the above, Mrs. Fleming found that a similar plate of a neighbouring region (R.A. 17h. 24m. to 18h. 11m., dec. 27° 8' S. to 38° 0' S.) shows a deficiency of red stars, but contains several stars having peculiar spectra. These include stars of the third type, a variable of the fourth type, two of the fifth type with bright lines, and two gaseous nebulae.

THE CALCULATION OF COMETARY ORBITS.—It frequently occurs that the definitive calculation of a comet's orbit is carried out by two or more calculators working independently, and without the whole of the available observational data. This leads to varying results and confusion, which Prof. Kobold is trying to obviate. For this purpose he publishes in No. 4319 of the *Astronomische Nachrichten* a list of comets since 1757, with the names of the workers by whom the definitive orbits have been, or are being, worked out. The present list accounts for forty-six comets, and Prof. Kobold will welcome any additions thereto.

PHOTOMETRIC OBSERVATIONS AT CATANIA.—A paper by Signor A. Bemporad, in which he describes and discusses the photometric observations made at Catania during the three years 1904-6, appears as an abstract from vol. xxxvii. of the *Memorie della Società degli Spettroscopisti Italiani*.

The programme of work included (1) the determination of the wedge constant; (2) the study of the extinction curve for Catania and then for the Etna Observatory; (3) the determination of the atmospheric absorption at both places; and (4) the observations of variable stars. The results obtained under each heading are fully discussed in the memoir, and the light-changes of a number of variables are compared with previously published ephemerides.

RECENT SOLAR RESEARCH.—As a reprint from vol. xxxvii. of the *Memorie della Società degli Spettroscopisti Italiani* we have received an interesting paper, in which Prof. Ricco discusses the recent work done in the field of solar research. Most of the subjects have already been discussed in these columns, e.g. Hale's vortices, Deslandres's filaments, Belopolsky's anomalous forms of the K line in 1906-7, &c., but readers of Italian will find Prof. Ricco's review to be a useful *résumé* of all these researches.

OCCULTATIONS OF PLANETS.—In a brief note appearing in No. 5, vol. lxxix., of the Monthly Notices (p. 431), Dr. Downing gives the data for two occultations of planets by the moon, during the present year, observable at British observatories. Times and position-angles of immersion and emersion are given for occultations of Mars and Venus visible at Ottawa and Sydney respectively, the former on September 1, the latter on November 17.

SS AURIGÆ (31.1907) AN IRREGULAR VARIABLE.—A note from Prof. Hartwig, appearing in No. 4319 of the *Astronomische Nachrichten*, announces that the Bamberg observations show the star SS Aurigæ to be an irregular variable of the SS Cygni type.